112. Proposed by COOPER D. SCHMITT, A. M., Professor of Mathematics, University of Tennessee, Knoxville, Tenn.

In *Hall and Knight's Higher Algebra*, I find the following:

If $a+b+c=0$, then

$$\frac{a^5+b^5+c^5}{5}=\frac{a^3+b^3+c^3}{3}\cdot\frac{a^2+b^2+c^2}{2}; \quad \frac{a^7+b^7+c^7}{7}=\frac{a^5+b^5+c^5}{5}\cdot\frac{a^2+b^2+c^2}{2};$$

also if $a+b+c+d=0$, then

$$\frac{a^5+b^5+c^5+d^5}{5}=\frac{a^3+b^3+c^3+d^3}{3}\cdot\frac{a^2+b^2+c^2+d^2}{2}.$$

QUERY. Is there a general law governing such expressions? Investigate.

*** Solutions of these problems should be sent to J. M. Colaw not later than January 10.

GEOMETRY.

131. Proposed by J. W. YOUNG, Graduate Student, Ohio State University, Columbus, Ohio.

Prove that $\lambda+\mu\omega+\nu\omega^2$, where λ, μ, ν are integers whose sum is ± 1, represents the points of a quilt formed by regular hexagons. ω=primitive cube root of unity. [From *Harkness and Morley's Introduction to Theory of Functions.*]

132. Proposed by ELMER SCHUYLER, Reading, Pa.

To draw a circle to cut two given circles orthogonally.

133. Proposed by P. C. CULLEN, Principal of Public Schools, Indianola, Neb.

If the two bisectors, trisectors, quadrisectors, etc., of the base angles of a triangle are mutually equal, show that the triangle is isosceles.

134. Proposed by J. C. CREGG, A. M., Superintendent of Schools, Brazil, Ind.

If $ABCD$ is a quadrilateral circumscribing a circle, show that the line joining the middle points of the diagonals AB, CD passes through the center of the circle.

*** Solutions of these problems should be sent to B. F. Finkel not later than January 10.

CALCULUS.

102. Proposed by G. B. M. ZERR, A.M., Ph.D., Professor of Mathematics and Science, Chester High School, Chester, Pa.

A right cone has its vertex at the focus of a paraboloid of revolution, the axis of the cone perpendicular to the axis of the paraboloid. Find the volume common to both.

103. Proposed by HON. JOSIAH H. DRUMMOND, LL. D., Portland, Me.

A park, in the shape of an ellipse whose diameters are 100 and 50 rods, respectively, is surrounded by a wall: one end of a rope, whose length is the circumference of the ellipse, is fastened (outside of the wall) at one end of the longer diameter and the other end at the otoer end of the same diameter. Over how much surface will a horse graze, which is fastened to a ring moving freely on the rope?

*** Solutions of these problems should be sent to J. M. Colaw not later than January 10.